The Beagle, Records of the Museums and Art Galleries of the Northern Territory, 2001 **17**: 37-41

Short communication

Bait-taking fireworms (Amphinomidae: Polychaeta) and other polychaetes

CHRISTOPHER J. GLASBY[1] AND JULIE BAILEY-BROCK[2]

[1]*Museum and Art Gallery of the Northern Territory*
GPO Box 4646, Darwin, NT 0801, AUSTRALIA
chris.glasby@nt.gov.au
[2]*Department of Zoology, University of Hawaii*
2538 The Mall, Honolulu, Hawaii 96822, USA
jbrock@hawaii.edu

Catching polychaete worms on baited hooks while fishing or luring them to take bait in an aquarium is noteworthy because it represents evidence for carrion feeding, a feeding mode relatively uncommon amongst polychaetes. Polychaetes that are able to quickly detect and actively locate carrion are true scavengers, in contrast to detritivores, which fortuitously locate and consume animal remains (Britton and Morton 1994).

One of the earliest examples of a polychaete being captured with hook and line is that of the acoetid *Polyodontes maxillosus*, a tube-dwelling worm reaching 1-2 m in length. Anglers in the Mediterranean Sea and Atlantic coasts of France and Spain have caught this species (Eisig 1887; Saint-Loup 1889; Fauvel 1923; Parenzan 1980; Pettibone 1989). Apparently, after being hooked, the worm withdraws into its tube and holds on so tenaciously that the angler's only prize is a wriggling anterior end comprising the muscular pharynx and jaws! So bizarre in appearance was this wriggling 'monster' that it baffled many well-known marine biologists who thought it could have been a type of larva or a strange enigmatic animal (Parenzan 1980).

Perhaps the best known group of scavenging polychaetes is the Onuphidae. Although many species appear to scavenge drift algae, some such as deep sea *Hyalinoecia* and the Australian beachworms (e.g., *Australonuphis* and *Hirsutonuphis*) supplement their diet with carrion (Fauchald and Jumars 1979; Paxton 1979). Species of *Australonuphis* can move some distances toward a washed up whale or sheep (Paxton 1979). Australian beachworms are collected in large numbers by professional bait collectors and anglers from east coast surf beaches. They are lured to the surface by dragging a piece of bait over the sand and when they pop their heads out, the collector grabs the worm behind the head with a pair of pliers or fingers (Paxton 1979).

Other polychaetes that have been caught with hook and line are the eunicids *Eunice cf. aphroditois* (Pallas) from the Mediterranean (G. Bellan, pers. comm) and *Eunice roussaei* Quatrefages from the Atlantic Coast of Spain (J. Grall, pers. comm). Like *Polyodontes maxillosus*, these eunicids are also large, powerful, jawed polychaetes and predation upon smaller invertebrates is likely to be an important feeding mode. However, both acoetids and eunicids include species that are carnivores, omnivores and scavengers (Fauchald and Jumars 1979), so it is not possible to say with certainty whether these species regarded the bait as carrion (and were acting as scavengers) or mistook its movement for live prey (hence predators).

Another polychaete family known to take baits is the Amphinomidae, or fireworms. These are jawless worms, each with a muscular, protrusible pharynx and well-developed anterior sense organs. Although known for some time in both Australia (R. Willan, pers. comm.) and Hawaii (J.B.-B. pers. obs.), this bait-taking behaviour appears not to have been previously documented in the literature. Most amphinomids are thought to be slow-moving predators of sessile animals such as sponges, corals, hydroids and ascidians, but some species are known or suspected of being carrion feeders (Marsden 1963; Fauchald and Jumars 1979). We provide further examples below of bait taking and scavenging behaviour in the family.

Abbreviation used in this paper: NTM, Museum and Art Gallery of the Northern Territory, Darwin.

Chloeia flava (Pallas)

A specimen of the Indo-Pacific species *Chloeia flava* was captured recently on a hook baited with a piece of beef, near the mouth of the Elizabeth River near Darwin, northern Australia (Fig. 1A-B; NTM W17241). The worm ingested the baited hook, which became lodged in the anterior part of the gut and protruded ventrally at about the 11th or 12th segment. The species is also known to take baits of fish or prawns in Australia (NTM Information Leaflet No. 17). *Chloeia flava* and other species in the genus have a keeled caruncle with complexly folded margins (Kudenov 1995), which provides a large area to present the chemosensory nuchal organs. An undescribed species of *Chloeia* from Bali, Indonesia, holds this structure erect whilst foraging (Fig. 2), thus exposing the nuchal organs to water currents and perhaps allowing improved visual field. These observations support the prediction by Fauchald and Jumars (1979) that species of *Chloeia* associated with sand and mud are carrion feeders.

Eurythoe complanata (Pallas)

The widespread tropical and subtropical species *Eurythoe complanata* is common on rubble bottoms in shallow water around the coast of Australia and Hawaii (Fig. 3). Members of the genus are thought to be primarily carrion feeders (Fauchald and Jumars 1979; Kudenov 1995). This is supported by our present observations. Specimens kept in aquaria can be conditioned to grab a piece of fish or squid tentacle held by hand (B. Paavo pers. comm.). However, the species also shows predatory tendencies, feeding on corals, molluscs and other worms at the Waikiki Aquarium, Honolulu, Hawaii (J.B.-B. pers. obs.). Gut content studies of at least 10 large-sized specimens revealed only fragments of coralline algae and coarse sand grains but no evidence of animal remains, indicating that feeding may be infrequent or that animal remains are difficult to detect in the gut contents (J.B.-B. pers. obs.). Like *Chloeia*, they also have a well-developed keeled caruncle, but the nuchal organs follow paired lateral ridges rather than a folded margin (Kudenov 1995).

Hermodice carunculata (Pallas)

The amphi-Atlantic species *Hermodice carunculata* (Fig. 4) is predatory on corals and sea anemones, but populations living on sandy bottoms may be carrion feeding scavengers (Marsden 1963). This prediction is supported by observations in the Mediterranean of individuals found attached to dead fish, either trapped in gill nets or washed up on the shore (N. Ben-Eliahu, H. Zibrowius, pers. comm.). The caruncle of *Hermodice*

Fig. 1. Specimen of *Chloeia flava* (NTM W17241) caught on a baited hook from the Elizabeth River, Darwin. **A**, dorsolateral view; **B**, ventrolateral view. Photos Tim Berra.

Fig. 2. *Chloeia* sp. found under a rock, Tulamben, Bali, Indonesia showing the erect caruncle on the head (right end). Specimen preserved (NTM W17191). Photo Karen Gowlett-Holmes.

Fig. 3. *Eurythoe complanata* found under a rock, east coast of Australia. Note the different colour morphs. Photo Kathy Atkinson.

Fig. 4. *Hermodice carunculata* in its natural habitat, Malta, Mediterranean Sea. Photo David George.

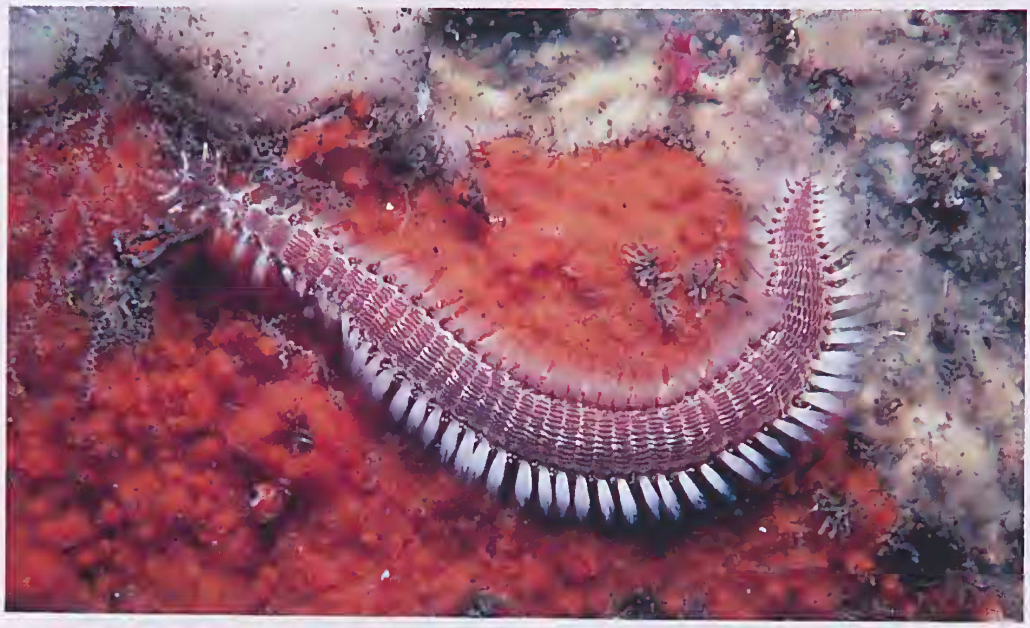

Fig. 5. *Pherecardia striata* found under a rock, Tulamben, Bali, Indonesia, showing the erect fan-shaped caruncle on the head (left end). Photo Karen Gowlett-Holmes.

lacks a medial keel and is relatively wider than those of *Chloeia* and *Eurythoe*, but has several transverse folds (Fauchald 1977), which may serve to present a greater surface area for nuchal organ distribution.

Pherecardia striata (Kinberg)

The widespread tropical species *Pherecardia striata* (Fig. 5) is an active predator that will swallow pieces of fish and live prey such as small crabs, shelled gastropods, and other worms (Bailey-Brock 1987). On the Pacific coast of Panama, *Pherecardia striata* preys upon injured crown-of-thorns starfish (Glynn 1984). This carrion feeding ability is supported by the present observations of the species being caught by Hawaiian anglers on baited hooks (5 to 7 incidences over twenty years or longer). The worms are caught close to the rubble bottom, either from the shore or from small boats. Further, observations in aquaria show that this species can be hand fed (J.B.-B. pers. obs.). Worms will emerge from under a rock and come off the bottom and swim to the surface to take a piece of fish or meat held in a pair of forceps. In this instance the chemosensory structures detect the food before vision comes into play. The caruncle of *Pherecardia striata* is similar to that of *Chloeia* species (Kudenov 1995). Like that in *Chloeia*, it also appears to be able to be held erect in worms foraging on the seabed (Fig. 5).

CONCLUSIONS

The examples above are indicative of true scavenging behaviour in which carrion is detected and located. Chemoreception appears to be the main way of detecting carrion in the Amphinomidae; this has been shown here for *Pherecardia striata* in aquaria and in the laboratory (Glynn 1984). The nuchal organs, ciliated structures behind the head, are likely to be the primary site for receiving chemical cues, although this has never demonstrated experimentally in any polychaete. In the Amphinomidae, the nuchal organs are arranged in bands around a large, often folded structure called the carunele. All four genera dealt with here have well-developed caruncles and nuchal organs on the head just posterior to the eyes. In at least two genera (*Chloeia* and *Pherecardia*), the caruncles carrying the nuchal organs appear to be held erect in foraging, further evidence of their chemosensory role. The presence of well-developed nuchal organs and bait-taking abilities of these species suggests that amphinomids are among the best scavenging experts in the Polychaeta.

ACKNOWLEDGMENTS

We are grateful to Brian Paavo, University of Hawaii, for his observations on *E. complanata* and helpful comments on a draft of the manuscript. We thank the polychaete research community for their generosity in responding to an email request for information on bait-taking worms. Karen Gowlett-Holmes, Kathy Atkinson, David George and Tim Berra kindly allowed us to use their excellent photographs.

REFERENCES

Bailey-Brock, J.H. 1987. Chapter 2. Annelida. In: Devaney, D.M. and Eldredge, L.G. (eds) *Reef and Shore Fauna of Hawaii*. Pp. 213-454. Bishop Museum Special Publication **64** (2 and 3). Bishop Museum Press: Honolulu, Hawaii.

Britton, J. C. and Morton, B. 1994. Marine carrion and scavengers. *Oceanography and Marine Biology: an Annual Review* **32**: 369-434.

Eisig, H. 1887. Monographie der Capitelliden des Golfes von Neapel und der angrenzenden meeres-abschnitte nebst untersuchungen zur vergleichenden anatomie und physiologie. *Fauna und Flora des Golfes von Neapel und der angrenzenden meeres-abschnitte herausgeben von der Zoologischen Station zu Neapel* **16**: 1-906.

Fauchald, K. 1977. The polychaete worms. Definitions and keys to the orders, families and genera. *Natural History Museum of Los Angeles County, Science Series* **28**: 1-188.

Fauchald, K. and Jumars, P.A. 1979. The diet of worms: a study of polychaete feeding guilds. *Annual Review of Oceanography and Marine Biology* **17**: 193-284.

Fauvel, P. 1923. Polychètes errantes. *Faune de France* **5**: 1-488.

Glynn, P.W. 1984. An amphinomid worm predator of the crown-of-thorns sea star and general predation of asteroids in eastern and western Pacific coral reefs. *Bulletin of Marine Science* **35**: 54-71.

Information Leaflet No. 17. 'Fire' Worms. Museums & Art Gallery of the Northern Territory.

Kudenov, J.D. 1995. Family Amphinomidae Lamarck, 1818. In: Blake, J.A., Hilbig, B. and Scott, P.H. (eds) *Taxonomic Atlas of the benthic fauna of the Santa Maria Basin and Western Santa Barbara Channel. Volume 5. The Annelida. Part 2. Polychaeta: Phyllodocida (Syllidae and scale-bearing families), Amphinomida, and Eunicida*. Pp. 207-216. Santa Barbara Museum of Natural History: Santa Barbara, California.

Marsden, J.R. 1963. The digestive tract of *Hermodice carunculata* (Pallas). Polychaeta: Amphinomidae. *Canadian Journal of Zoology* **41**: 165-184.

Parenzan, P. 1980. Un reperto interessante nel mare di porto cesareo. *Thalassia Salentina* **10**: 135-137.

Paxton, H. 1979. Taxonomy and aspects of the life history of Australian beachworms (Polychaeta: Onuphidae). *Australian Journal of Marine and Freshwater Research* **30**: 265-294.

Pettibone, M.H. 1989. Revision of the aphroditoid polychaetes of the family Acoctidae Kinberg (=Polyodontidae Augener) and reestablishment of Acoctes Audouin and Milne-Edwards, 1832, and Euarche Ehlers,1887. *Smithsonian Contributions to Zoology* **464**: 1-138.

Saint-Loup, R. 1889. Sur le *Polyodontes maxillosus*. *Comptes rendus Hebdomadaires des Séances de l'Académie des Sciences* **109**: 412-414.

Accepted 16 October 2001